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EXAMINER

KIM, YOUNG J

ART UNIT PAPER NUMBER

1637

DATE MAILED: 07/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/674,090

Applicant(s)

EICHEN ET AL.

Examiner

Young J. Kim

Art Unit

1637

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 18 April 2005.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3-13,15,16,18-31 and 33-46 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3-13,15,16,18-31 and 33-46 is/are rejected.
- 7) ☒ Claim(s) 46 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10/26/00 & 1/2/02 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

The present Office Action is responsive to the Amendment received on April 18, 2005.

Claim interpretation

For the purpose of examination, the term, "target," has been assumed to be limited to biological molecules; and the term, "recognition moiety," has been also assumed to be limited to biological molecules, as when the claims are read in light of the specification, the terms are limited to the invention which pertains to biological molecules (i.e., nucleic acids, protein, antibody, etc.).

MPEP 608.01(o) states that the meaning of every term used in any of the claims should be apparent from the descriptive portion of the specification with clear disclosure as to its import.

This is necessary in order to insure certainty in construing the claims in the light of the specification, Ex parte Kotler, 1901 C.D. 62, 95 O.G. 2684 (Comm'r Pat. 1901).

Claim Objections

Claim 46 is objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form.

Claim 46 is dependent on claim 31. Claim 31 is drawn to a kit, a product, comprising a) an assay device; and b) reagents comprising i) solution comprising nucleation-center forming entities; and ii) combination of metal ions and a reducing agent.

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Claim 46 recites that the kit of claim 31, wherein said reagents comprise nucleation center-forming entities. The phrase, "that deposit or bind...." is an intended use limitation that does not confer positive limitation on the make up of the reagent. Further, claim 46 does not further limit claim 31 because, as defined by claim 46, the reagents only need nucleation center-forming entities, which is broader in scope from the reagent in claim 31 which need the nucleation center-forming entities as well as metal ions and a reducing agent.

Correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 1, 3-9, 18-23, 31, 33, 35-38, 43, 44, and 46 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 is indefinite because the claim is drawn to a system which *comprises* a) an assay device; b) an electric or electronic module; and c) reagents. However the reagent is described *conditionally* as, "when deposited," rendering the claim confusing whether the reagent is a definite part of the system or not. For the purpose prosecution, it is assumed that the reagents are part of the system.

Claims 3-9, 18-23, 38, 43, and 44 are also indefinite by way of their dependency on claim

1.

Claims 31, 33, and 46 are indefinite for the same reason as claim 1.

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Claim 1 is indefinite for reciting the phrase, "a solution comprise nucleation-center forming entities for binding to said target *if present in the sample*," because it is unclear whether the *italicized* conditional statement is referring to the "target" or the "solution." The former interpretation has been assumed.

Claims 3-9, 18-23, 38, 43, and 44 are also indefinite by way of their dependency on claim 1.

Claims 31, 33, 35-37, and 46 are indefinite for the same reason described immediately above.

The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 10, 12, 13, 15, 16, and 34 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention. This is a New Matter rejection.

Claims have been amended to from a genus pertaining to the reagents comprising monomers of conducting polymers, to a subgenus pertaining to the reagents comprising monomer of conducting polymers which are *non-nucleic acid* in nature.

While the instant application as filed has description for the above-genus of monomers of conducting polymers, the instant application does not have description for a subgenus that excludes nucleic acids from said monomer of conducting polymers. The instant specification

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gives a species within such subgenus – polyaniline. However, a single species contemplated cannot be representative of the species embraced by the subgenus.

In addition, Applicants had not pointed to where in the instant specification such support can be found.

MPEP 714.02 states that, “[t]he prompt development of a clear issue requires that the replies of the applicant meet the objections to and rejections of the claims. Applicant **should also specifically point out the support** for any amendments made to the disclosure.

Additionally, MPEP § 2163.06(II) states that, “[w]hen an amendment is filed in reply to an objection or rejection based on 35 U.S.C. 112, first paragraph, a study of the entire application is often necessary to determine whether or not "new matter" is involved. **Applicant should therefore specifically point out the support** for any amendments made to the disclosure.”

Claims 30, 40 and 42 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Factors to be considered in determining whether a disclosure would require undue experimentation are summarized in *In Re Wands* (858 F.2d 731, 8 USPQ2d 1400 (Fed. Cir. 1988)). They include (A) the quantity of experimentation necessary, (B) the amount of direction or guidance presented, (C) the presence or absence of working examples, (D) the nature of the invention, (E) the state of the prior art, (F) the relative skill of those in the art, (G) the predictability or unpredictability of the art, and (H) the breadth of the claims.

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(H) Breadth of the claims: claims 40 and 41 are drawn to methods which employs the assay device of the instant invention, wherein the method determines the concentration of the target in the sample.

(B) Amount of direction/guidance: pages 59-61 gives general guidance in the method of determining concentration of the target in a sample. However, the description provided by the instant specification is only in theory. For example, the instant specification makes a hypothetical situation of 10,000 hybridization site array which can be composed of 100 individual detection sites per hybridization site to give a 1,000,000 site multiplex array (page 60, 2nd paragraph). Based on this hypothetical example, the instant specification states that if there exists n detection-sites per one hybridization site of the array, and if that detection site is made small enough, such that for a given target sample, the probability to have a DNA (or RNA) molecules hybridized to it is less than unity, which will result in $m < n$ conductive detection sites and that a quantitative measurement of the amount of target molecules can be performed by counting the fraction of positive conducting sites, m/n within each hybridization site. All is based on the hypothetical situation that each hybridization site comprise n number of detection sites, wherein each detection site is made small enough so as that a DNA hybridized thereto is less than 1 and that all nucleic acid that binds to at least one recognition moiety conduct electricity between the two electrodes of an assay set. Additionally, for the method to work, the number of probes (or recognition moiety) comprised by the device/system must be equal of exceed the number of the target present in the sample. And all of the voltage generated from such binding events must be compiled into a total concentration of the target, which first requires a standard which correlates a certain voltage with a certain concentration which would

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necessarily introduce variability between different assays. The instant specification gives no guidance how to account for such variability nor does the specification give a single example which accounts for such variability, and its use for determining the concentration of target in a sample.

(C) Absence of Working example: The instant specification only gives a theoretical basis for determining the concentration of target in a sample, but lacks working examples.

(G) Unpredictability: As discussed above, a method of determining the actual concentration of target in a sample by voltammetry requires a combination of experiments involving variability, resulting in unpredictability.

(F) Skill level: The level of the artisan in question is considered high.

Absent evidence to the contrary, to practice the method as claimed one skilled in the art must first make a device comprising multiple hybridization sites, said hybridization sites, each comprising detection sites that are small enough so as that a DNA hybridized thereto is less than 1, if possible, and employ multiple variables, such as accounting for false positive signals, accounting for variability in experiments when generating calibration data, correlating the concentration of the target from the calibration data, etc. all of which render the determination of concentration highly unpredictable, requiring undue experimentation.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

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(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1, 3-5, 10-13, 15, 16, 24-29, 35, 36, 39, 41, and 43-45 are rejected under 35

U.S.C. 102(b) as being anticipated by Braun et al. (Nature February 19, 1998, vol. 391, pages 775-778).

Braun et al. disclose a system/device and a method of their use comprising:

(a) an assay device comprising one or more assay sets, each of the assay sets comprising at least two electrodes and a recognition moiety, said recognition moiety being oligonucleotides (page 777, 2nd column, 2nd paragraph);

(b) an electric or electronic module arranged and configured to measure electric conductance;

(c) reagents comprising nucleation-forming entities and combination of metal ions, which detects target DNAs (column 777, 2nd column, *Silver deposition*);

(Figure 1; Figure 4; page 775, 2nd column, 2nd paragraph; page 776, 1st column, 3rd paragraph), anticipating claims 1, 3-5, 24-25, 29, 35, 39, 41, 43, 44, and 45.

With regard to claim 36, Braun et al. disclose that the distance between the electrodes are between 12-16 μm .

Braun et al. disclose that the use of DNA polyanions as a template to fabricate a poly-(*p*-phenylene vinylene) (PPV) filament by attaching a positively charged *pre*-PPV polymer to be stretched DNA and subsequently treating it to form a highly photoluminescent PPV wire known (page 777, 1st column, 2nd full paragraph), anticipating claims 10-13, 15, 16, 26, 27, and 28.

Therefore, Braun et al. anticipate the invention as claimed.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 31, 33, 34, and 46 rejected under 35 U.S.C. 103(a) as being unpatentable over Braun et al. (Nature February 19, 1998, vol. 391, pages 775-778).

Braun et al. disclose a system/device and a method of their use comprising:

(a) an assay device comprising one or more assay sets, each of the assay sets comprising at least two electrodes and a recognition moiety, said recognition moiety being oligonucleotides (page 777, 2nd column, 2nd paragraph);

(b) an electric or electronic module arranged and configured to measure electric conductance;

(c) reagents comprising nucleation-forming entities and combination of metal ions, which detects target DNAs (column 777, 2nd column, *Silver deposition*) (Figure 1; Figure 4; page 775, 2nd column, 2nd paragraph; page 776, 1st column, 3rd paragraph).

Braun et al. disclose that the distance between the electrodes are between 12-16 μm .

Braun et al. disclose that the use of DNA polyanions as a template to fabricate a poly-(*p*-phenylene vinylene) (PPV) filament by attaching a positively charged *pre*-PPV polymer to be stretched DNA and subsequently treating it to form a highly photoluminescent PPV wire known (page 777, 1st column, 2nd full paragraph).

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Braun et al. do not explicitly disclose that the device and the reagents employed in their disclosure are packaged as a kit.

It would have been *prima facie* obvious to one of ordinary skill in the art at the time the invention was made to package the device and the reagents employed by Braun et al. into a kit in view of the conventionality of kits in the analytical arts for the advantages of convenience, cost-effectiveness, matched and/or preweighed components, etc.

Therefore, the invention as claimed is obvious over the cited references.

Claims 6-9, 18-21, 37, and 38 are rejected under 35 U.S.C. 103(a) as being unpatentable over Braun et al. (Nature February 19, 1998, vol. 391, pages 775-778).

Braun et al. disclose a system/device and a method of their use comprising:

(a) an assay device comprising one or more assay sets, each of the assay sets comprising at least two electrodes and a recognition moiety, said recognition moiety being oligonucleotides (page 777, 2nd column, 2nd paragraph);

(b) an electric or electronic module arranged and configured to measure electric conductance;

(c) reagents comprising nucleation-forming entities and combination of metal ions, which detects target DNAs (column 777, 2nd column, *Silver deposition*) (Figure 1; Figure 4; page 775, 2nd column, 2nd paragraph; page 776, 1st column, 3rd paragraph).

Braun et al. disclose that the distance between the electrodes are between 12-16 μm .

Braun et al. disclose that the use of DNA polyanions as a template to fabricate a poly-(*p*-phenylene vinylene) (PPV) filament by attaching a positively charged *pre*-PPV polymer to be

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stretched DNA and subsequently treating it to form a highly photoluminescent PPV wire known (page 777, 1st column, 2nd full paragraph).

The system/device and the method of their use disclosed by Braun et al. are drawn to a single assay set, that is, a system/device/method comprising two electrodes each of which comprise an oligonucleotide immobilized thereto; and the artisans do not explicitly disclose a system/device comprising multiple assay sets.

It would have been *prima facie* obvious to one of ordinary skill in the art to duplicate the assay set of Braun et al. to arrive at the claimed invention of a system/device comprising multiple assay sets and the method of their use for the following reasons.

In *in re Harza*, 274 F.2d 669, 124 USPQ 378 (CCPA 1960), the court expressed that duplication of parts, in the instant situation, the duplication of the assay set of Braun et al., has no patentable weight unless a new and unexpected result is provided.

In the instant situation, one of ordinary skill in the art would have clearly expected that the duplication of the assay set of Braun et al. would have resulted in the multiple and simultaneous detection of targets in sample, as devices comprising a plurality of binding sites has been well known and established in the art of biological detection (*i.e.*, Affymetrix®).

With regard to claims 6-9, while Braun et al. are not explicit in employing other well known metal particles which conduct electricity, such as platinum or gold, for the purpose of “metallizing” the bridge formed between the electrodes of Braun et al., one of ordinary skill in the art would have recognized that any well known colloidal metal particles would have produced such “conductive bridge,” which allows the electricity to pass between the electrodes of Braun et al. One of ordinary skill in the art would have had a reasonable expectation of

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success at such modification given that Braun et al. already disclose that silver, another well known colloidal metal particle have been employed in generating a "conductive bridge."

Therefore, the invention as claimed is *prima facie* obvious over Braun et al.

Double Patenting

The provisional rejection of claims 24-30, 39-42, and 45 under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-15 of copending Application No. 10/452,139, made in the Office Action mailed on December 7, 2004 is withdrawn in view of the Terminal Disclaimer received on April 18, 2005.

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 1, 3-13, 15, 16, 18-23, 31, and 33-38, 43, 44, and 46 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-17 and 19-32 of copending Application No. 09/462,171. Although the conflicting claims are not identical, they are not patentably distinct from each other for the following reasons.

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Preliminarily, the '171 application has been recently allowed. Absent a properly filed Terminal Disclaimer, the rejection will be maintained when the Patent is issued therefrom.

Claims 1-17 and 19-32 of the '171 application is drawn to an electric network which comprises at least one nucleotide fiber (or recognition moiety) bound to form an electronic conductor (or electrodes), wherein said net work comprises at least two nucleotide fibers connected to one another at a junction in which one nucleotide segment of one fiber is bound to another nucleotide segment of another fiber by a sequence specific interaction (or target; see claims 3 and 11). The junction is further defined as a molecule, cluster of atoms or molecules or a particle bound to each of the nucleotide fibers (or target; see claims 4, 7, and 12), wherein when bound, electrically connects the electrodes (see claim 10). The nucleotide fiber is made electrically conductive by substance comprising a metal bound to the nucleotide fiber or portion thereof (or "conductive bridge" see claim 13).

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

Request for Information under 37 CFR 1.105

Applicants are advised that under 37 CFR 1.63, Applicants have the duty to disclose to the Office all information known to the person to be material to patentability.

Applicants are requested to disclose any copending application filed in the U.S. which have overlapping subject matter with the instant application.

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This request is made upon finding two related applications, the inventors of which are identical to that of the instant application, none of which claim priority to each other, subject to obviousness-type double patenting. Such would ensure compact prosecution of the application.

Conclusion

No claims are allowed.

The invention is drawn to a system which forms a conductive bridge between two electrodes via treating a complex formed therebetween with reagents which allows electricity to flow. The complex is formed between the two electrodes via immobilization of a recognition moiety to one of the electrodes and a target which binds thereto. While the prior art teaches the above method with regard to the recognition and target being nucleic acids, the prior art does not disclose or suggest the treatment of protein-antibody complex with reagents which results in the formation of the "conductive bridge." As there is no reasonable expectation of success at such modification, claims 22 and 23 drawn to this embodiment is determined to be non-obvious over the prior art.

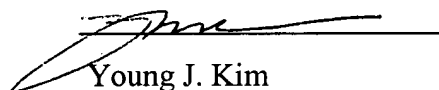
Inquiries

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Young J. Kim whose telephone number is (571) 272-0785. The Examiner is on flex-time schedule and can best be reached from 8:30 a.m. to 4:30 p.m. The Examiner can also be reached via e-mail to Young.Kim@uspto.gov. However, the office cannot guarantee security through the e-mail system nor should official papers be transmitted through this route.

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If attempts to reach the Examiner by telephone are unsuccessful, the Primary Examiner in charge of the prosecution, Dr. Kenneth Horlick, can be reached at (571) 272-0784. If the attempts to reach the above Examiners are unsuccessful, the Examiner's supervisor, Dr. Gary Benzion, can be reached at (571) 272-0782.

Papers related to this application may be submitted to Art Unit 1637 by facsimile transmission. The faxing of such papers must conform with the notice published in the Official Gazette, 1156 OG 61 (November 16, 1993) and 1157 OG 94 (December 28, 1993) (see 37 CFR 1.6(d)). NOTE: If applicant does submit a paper by FAX, the original copy should be retained by applicant or applicant's representative. NO DUPLICATE COPIES SHOULD BE SUBMITTED, so as to avoid the processing of duplicate papers in the Office. All official documents must be sent to the Official Tech Center Fax number: (571) 273-8300. For Unofficial documents, faxes can be sent directly to the Examiner at (571) 273-0785. Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (571) 272-1600.



Young J. Kim
Patent Examiner
Art Unit 1637
7/7/2005

**YOUNG J. KIM
PATENT EXAMINER**

yjk